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(54) Steam turbine bleeding slot

(57) Bled steam is directed through a slot 4 arranged such that steam turbulence on passing through the slot is minimised. For this purpose the inner part of a projection 1 of a first stator blade guide ring is rounded at 10 at the point of the slot 4, and the inner part of the adjacent stator blade guide ring 2 is shaped at the same point of the slot as a sloped projection 20 which causes it to direct a part of the steam flow into the slot. At least one of walls of the slot is bevelled as at 11, 21 so that the pressure of the bled steam during its passage through the slot may be considerably increased.

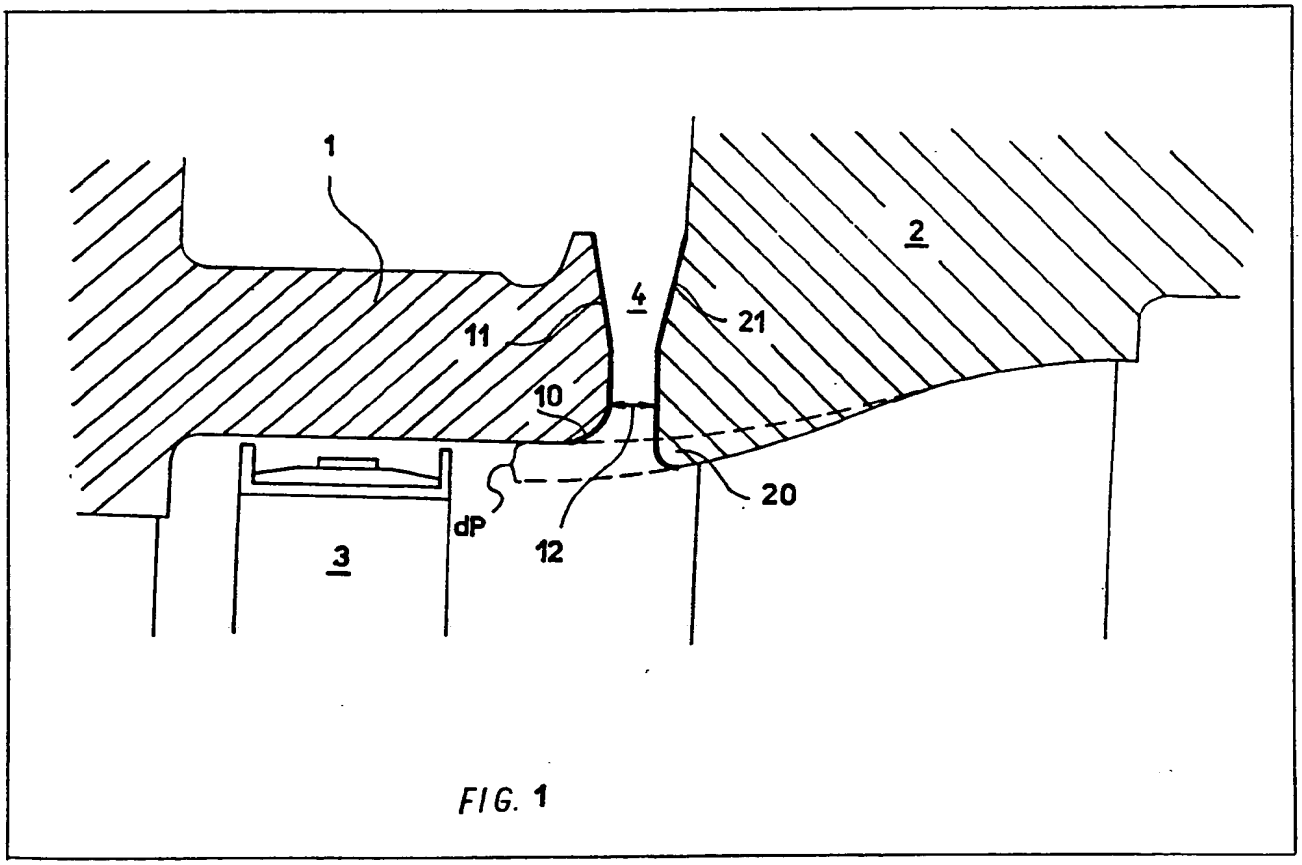

FIG. 1

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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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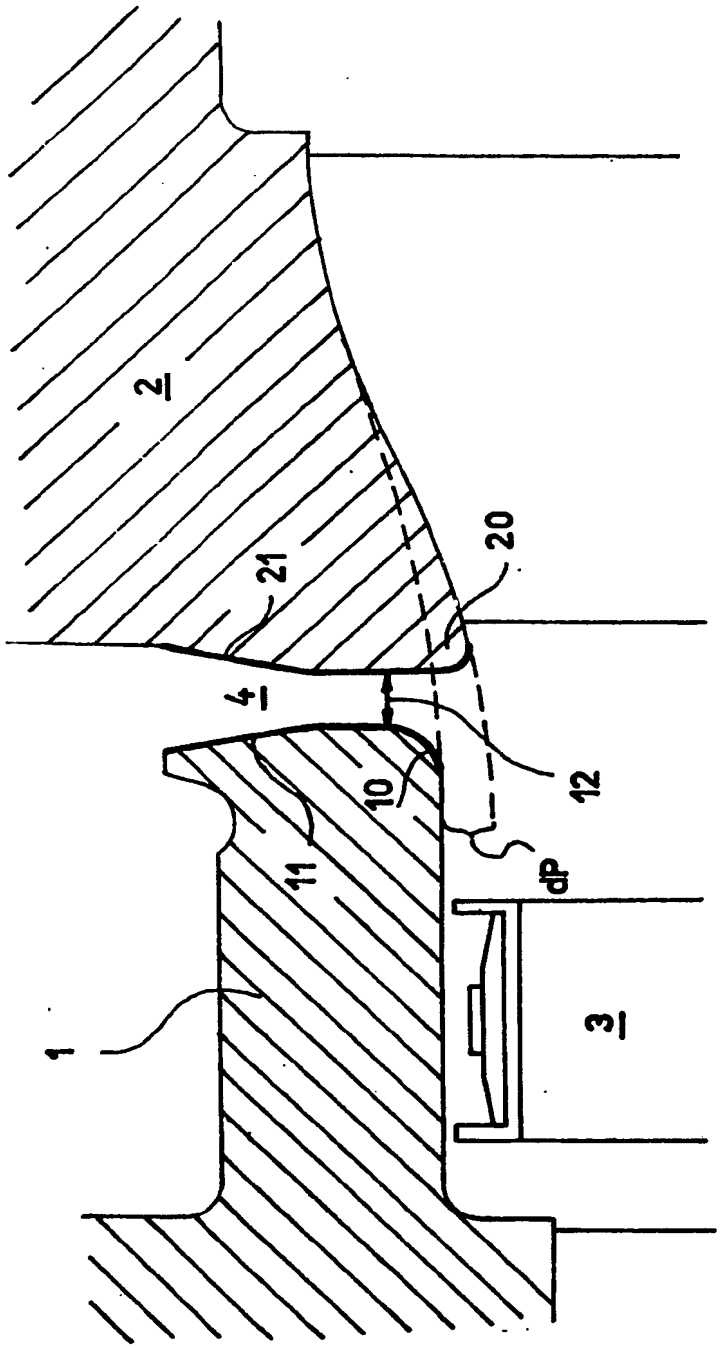

FIG. 1

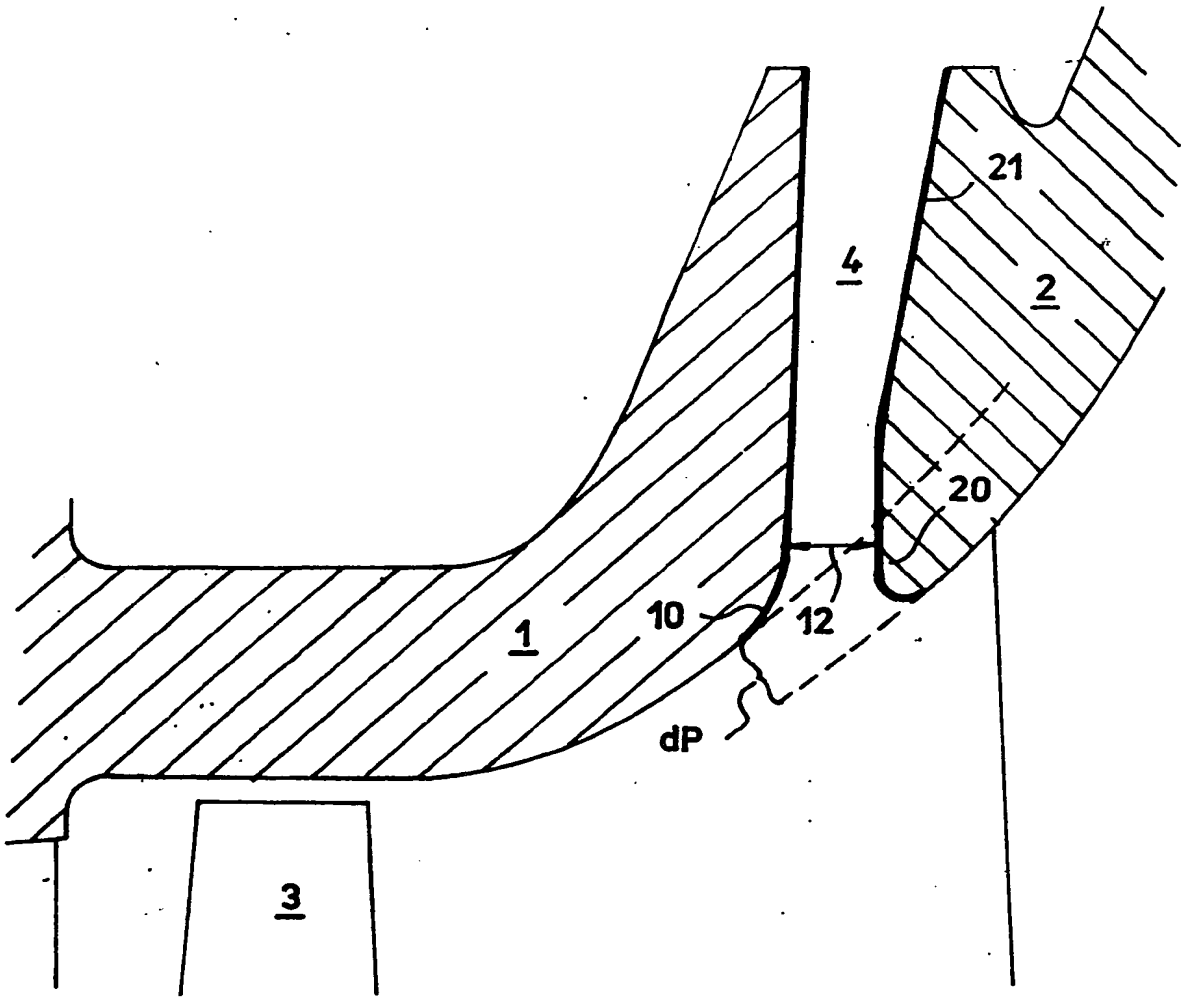

FIG. 2

SPECIFICATION

Bleeding slot

The invention relates to a bleeding slot formed between stages of a steam turbine for steam bleeding, for regenerating water heaters or heat and power plant water heaters.

Until now steam bleeding has been carried out by means of slots which have not been designed for the substantial utilization of the kinetic energy of bled steam, but as a simple channel, the arrangement of which was dependent upon the design of a specific stage of a steam turbine.

The main drawback of hitherto known solutions resides in the fact that they did not utilize to any great extent the kinetic energy of the steam flow, the most part of which was lost in turbulence.

The aim of the invention is to overcome the drawbacks of hitherto solutions and to achieve, in a simple way, and suitable for including in the design of steam turbines, means for enabling most of the kinetic energy of the bled steam to be transformed into pressure. A theoretical and experimental investigation has resulted in a bleeding slot according to the invention, the principle of which resides in the fact that a projection of a first guide wheel is, at the point of the bleeding slot, viz. on its inner part, provided with a rounding, and the adjacent guide wheel is provided, also at the point of the slot, on its inner part, with a sloped projection, and that at least one wall of the bleeding slot is also bevelled.

The advantage of the bleeding slot according to the invention resides in the fact that it utilizes in a substantial way the kinetic energy of the bled steam, most of which is transformed in the bleeding slot into pressure. The bleeding slot is relatively simple and it is possible for it to be realized in a simple way when designing it, because it does not require any special production technology or turbine assembly.

In order that the invention may be clearly understood and readily carried into effect, a preferred embodiment thereof is, by way of example, hereinafter more fully described and illustrated in the accompanying drawings, in which:

Figure 1 shows a section of a bleeding slot, formed between stages of the high-pressure part of a steam turbine, and

Figure 2 shows a section of the bleeding slot, formed between stages of the low-pressure part of a steam turbine.

As shown in Fig. 1, a bleeding slot 4, according to this embodiment, is formed between a projection 1 of a first guide (driving) wheel and an adjacent guide (driving) wheel 2. The projection 1 of the first wheel forms the front wall part of the bleeding slot 4 and the adjacent wheel 2 forms the back wall part of the bleeding slot 4. The projection 1 of the first wheel is provided on its inner part with a rounding 10. The inner part of the back wall of the bleeding slot 4 is situated below the portion 12 of the slot and in this way it forms a sloped projection 20. The outer part of the back wall and of the front wall of the bleeding slot 4 are provided in this embodiment with a bevel 21, 11 above the portion 12. In Fig. 2 the projection 1 of the first guide (driving) wheel as well as the guide (driving) wheel 2 are shaped differently depending upon the design of the low-pressure part of a steam turbine. The bevel 21 of the back wall of the bleeding slot 4 is not accompanied in this example with a bevel on the front wall. The bevel 21 is present only on the back wall of the bleeding slot 4, viz. also above the portion 12. A part of the steam *dP*, flowing from the impeller blade 3 to the other driving wheel 2, comes into the portion 12 of the bleeding slot 4, where it is directed by the rounding 10 and sloped projection 20. A part of steam dP is shown in Fig. 1, and Fig. 2 by dashed-lines. When the steam passes through the bleeding slot 4, its speed diminishes because of the enlarging of the section of the bleeding slot 4, which is caused by an increase in the radius of curvature and by bevelling 21 of the back wall, and also by bevelling 11 of the front wall of the slot 4. A substantial part of the kinetic energy of the bled steam is transformed in this way into a pressure increase. This high pressure steam then flows into a regenerating water heater or water heater of a heat and power plant (not shown). The pressure increase achieved by the bleeding slot 4 according to the invention enables water in the heater to be heated to a higher temperature than was possible until now. This effect results in an increase in the effiency of transformation of primary power into electric power or into heat for heating.

Although the invention is illustrated and described with reference to two preferred embodiments thereof, it is to be expressly understood that it is in no way limited to the disclosure of such preferred embodiments, but it is capable of numerous modifications within the scope of the appended claims.

CLAIMS

1. A bleeding slot formed between stages in a steam turbine and defined by a projection of a first guide wheel, which forms the front wall of the slot, and an adjacent guide wheel, which forms the back wall of the slot, in which the projection of the first guide wheel is, at the point of the bleeding slot, provided with a rounding, and the adjacent guide wheel is provided, at the same point of the slot, with a sloped projection, and that at least one wall of the bleeding slot is bevelled.

2. A bleeding slot according to Claim 1 when formed between stages in the high pressure part of a steam turbine.

3. A bleeding slot according to Claim 1 when

formed between stages in the low pressure part of a steam turbine.

4. A bleeding slot substantially as hereinbefore described with reference to Figure 1 or Figure 2 of the accompanying drawings.

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